

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Processes onboard the International Space Station and Beyond (7)

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MICROGRAVITY RESEARCH USING SMALL SATELLITES

Abstract

Physics in microgravity environments is a very new field of science. This knowledge is possible to acquire only performing experiments in weightlessness. The generation of a microgravity environment for extensive research is not so easy on the Earth.

In the next future small satellites can be used as experimental platforms improving their capabilities for microgravity research. It has been demonstrated that nanosatellites or picosatellites using the technology of CubeSats have been successfully developed by different universities around the world. Universities can intensively support designing new experiments for technology demonstration in microgravity environments.

Small satellites are conceived as dedicated systems to execute experiments or tests in space. We can compare a small satellite platform with others systems. A drop tower will be used to create some seconds (approximately 10 sec) of microgravity. Using sounding rockets the generated microgravity will take some minutes (max 14 min). With a small satellite platform the microgravity condition will result in months or longer! From this point of view small satellites have obviously much advantage than a drop tower or a sounding rocket by executing experiments in microgravity. For sure the others systems have also advantages like an intact experimental pay load (drop tower), or the recovery of the payload and recorded data in short time just after the flight (sounding rocket) but for a small satellite this system functionality can also be developed, so that the payload can be also recovered intact or the data provided to ground as quick as possible.

Peruvian engineers from different universities and research institutes are working on a next generation of subsystems and payloads to be tested and implemented in such experimental platforms. They are modelling and improving the capabilities of some, used in sounding rocket systems, important instruments which can be carried in the proposed small satellite platform. The instruments must be simplified, reduced in size, adapted and designed to properly perform their functions in the designed platform. All the subsystems will continually be designed for making them more efficient in order to use best possible the limited resources available in the satellite. Depending of the mission a next generation of pico satellites can emerge.

A joint venture between industry and academia allow the test of new space products and can support research institutions with more flexible and economical tools. That means our knowledge in microgravity physics will further growth.